Table S1. Details of the 28 studied earthquakes. Events with gray shading have only GCMT solutions because they are noisy/complicated for teleseismic body wave waveform modeling. Events with light blue shading are actually intraplate. Events with orange shading are M_w~7 events. Locations are from GCMT catalog and other source parameters are estimated in this study.

Date (UTC)	*Latitude*	*Longitude*	*Depth, km*	*Strike°*	*Dip°*	*Rake°*	*Magnitude*
1994/08/14, 09:06	38.72	142.25	37	177	25	66	5.75
1994/08/16, 10:09	37.91	142.40	24	184	36	87	5.79
1999/01/21, 22:02	38.55	143.05	21	166	18	57	5.77
1999/11/15, 01:34	38.30	142.31	48[1]	202	31	103	5.61
2002/10/12, 10:59	37.82	142.69	21	209	18	96	5.44
2002/11/03, 03:37	38.84	142.14	39	194	23	78	6.35
2003/10:31, 01:06	37.89	142.68	21[fixed]	180	18	67	6.89
2003/11/01, 13:10	37.77	143.27	12	209	14	102	5.82
2005/08/16, 02:46	38.24	142.05	40[fixed]	190	22	83	7.16
2005/08/24, 10:15	38.55	143.24	12	214	18	90	5.90
2005/08/30, 18:10	38.53	143.29	10	157	20	46	6.12
2005/12/02, 13:13	38.11	142.38	30	173	24	69	6.51
2005/12/16, 18:32	38.47	142.21	35	180	22	70	5.97
2007/12/25, 14:04	38.40	142.39	34	151	30	51	6.07
2008/12/03, 23:16	38.56	143.18	18	180	16	72	5.81
2008/12/05, 20:03	38.53	143.27	16	191	13	81	5.52
2011/03/09, 02:45	38.56	142.78	21[fixed]	174	19	63	7.32
2011/03/09, 18:16	38.33	142.80	20	168	20	58	6.00
2011/03/09, 18:44	38.47	143.50	18.3	190	17	77	5.9
2011/03/09, 21:22	38.29	142.91	22.5	195	20	87	6.0
2011/03/09, 21:24	38.27	142.82	22.6	191	19	80	6.5
2011/03/10, 08:08	38.53	143.61	13	159	23	53	5.66
2011/03/12, 23:24	38.05	141.72	16[2]	141	27	57	6.02
2011/03/13, 09:52	38.90	142.20	50.0	180	28	71	5.6
2011/03/25, 11:36	38.78	142.17	41	177	26	67	6.18
2011/03/31, 07:15	38.97	142.05	44	191	26	77	5.98
2011/07/23, 04:34	38.96	142.10	43	185	25	73	6.29
2011/07/24, 18:51	37.70	141.66	41	205	24	90	6.26

[1]Too deep to be on the plate interface. [2]Too shallow to be on the plate interface.

Figure S1. The same as Figure 7, except that all events' GCMT dip angles are shown for comparison.

Figure S2. The moment-dip-depth tradeoff for the 2011/03/09 M_w7.4 foreshock using W-Phase inversion.

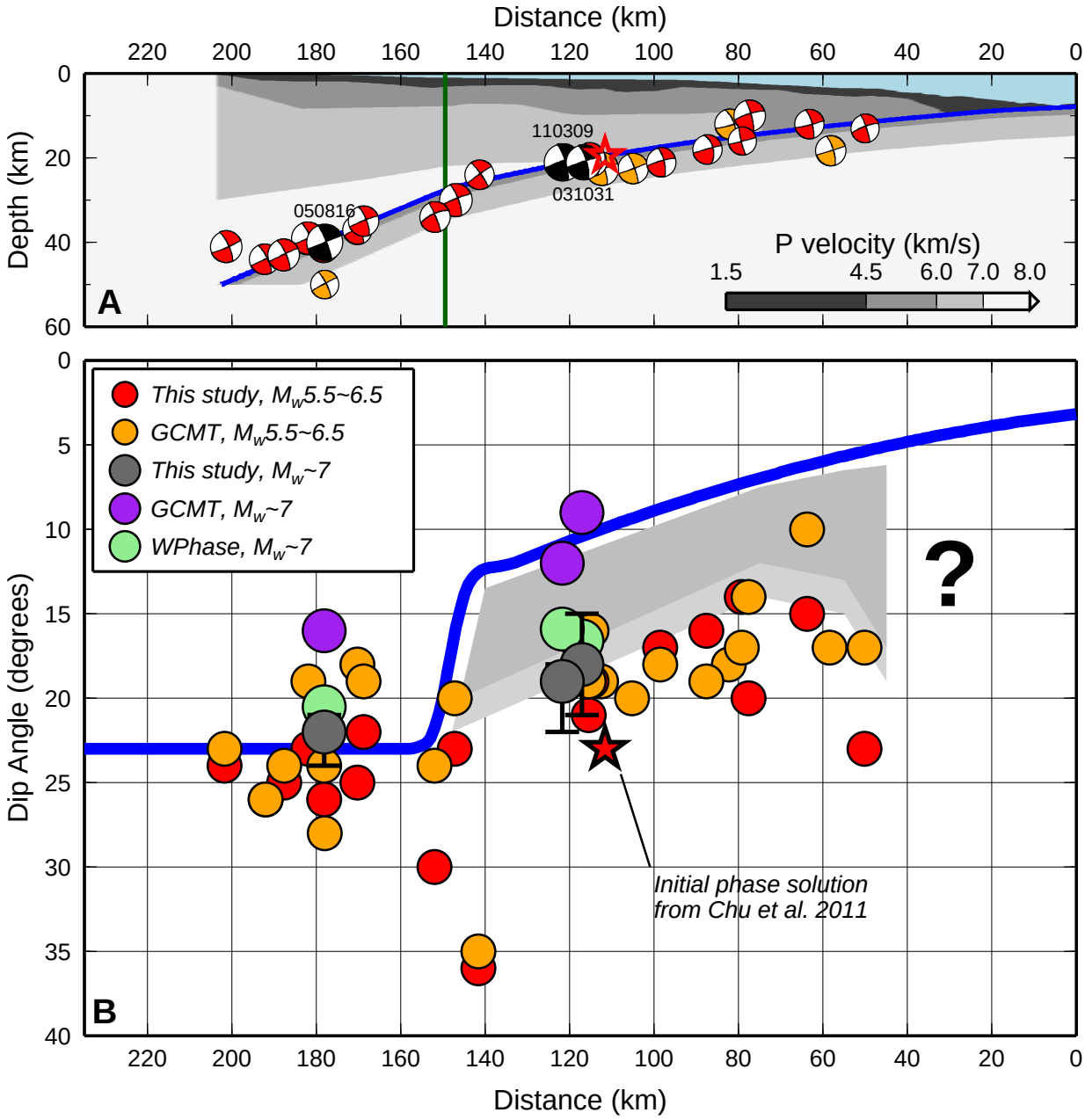
Distance (km)
220 200 180 160 140 120 100 80 60 40 20 0
Depth (km)
0 20 40 60
110309
031031
050816
P velocity (km/s)
1.5 4.5 6.0 7.0 8.0
A
This study, M_w5.5~6.5
GCMT, M_w5.5~6.5
This study, M_w~7
GCMT, M_w~7
WPhase, M_w~7
?
Initial phase solution
from Chu et al. 2011
Dip Angle (degrees)
0 5 10 15 20 25 30 35 40
B
220 200 180 160 140 120 100 80 60 40 20 0
Distance (km)

Figure S1

Figure S2